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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Igarashi et al.

Application No.: 10/530,289 **Group Art Unit:** 1794

Filing Date: April 5, 2005 **Examiner:** Garrett, Dawn L.

TITLE: ORGANIC ELECTROLUMINESCENT DEVICE

DECLARATION UNDER 37 C.F.R. § 1.132

1. I, Toshihiro Ise, a citizen of Japan, hereby declare and state as follows:
2. I received a Doctor's Degree in Chemistry from Tohoku University, Graduate School of Science in March 1999.
3. I joined Fuji Photo Film Co., Ltd. in April 1999 and have been engaged in the research and development of organic electroluminescence devices since that time.
4. I am a co-inventor of the invention disclosed and claimed in the above-identified patent application.
5. I am familiar with the contents of the application, its prosecution before the United States Patent & Trademark Office, and the references cited therein. I am particularly familiar with the Office Action dated March 11, 2008 and understand the Examiner's rejections therein.
6. I have studied the contents of the cited U.S. Patent Application Publication No. 2002/0125818 to Sato et al. (hereinafter, "Sato '818") and U.S. Patent No. 6,962,755 to Ise et al. (hereinafter, "Ise '755").
7. In order to demonstrate the unexpected superiority of the present invention, the following tests were conducted by me or under my supervision.
8. The Additional Example 1 is directed to the combination of CBP (hole-transport material), TPBI (electron-transport material) and $Ir(ppy)_3$ (luminescence material). This combination was made by the Examiner in the outstanding Office Action.

9. The Additional Comparative Examples 1 to 11 are directed to devices where CBP in the Additional Example 1 was replaced with other materials (hole-transport materials) disclosed in Sato '818.
10. The Additional Comparative Examples 12 to 15 are directed to devices where TPBI in the Additional Example 1 was replaced with other materials (electron-transport materials) disclosed in Sato '818.
11. The Additional Comparative Examples 16 to 23 are directed to devices where CBP in the Additional Example 1 was replaced with other materials (electron-transport materials) disclosed in Sato '818.
12. The Additional Comparative Examples 24 to 33 are directed to devices where CBP in the Additional Example 1 was replaced with other materials (hole-transport materials) disclosed in Sato '818.
13. The Additional Comparative Examples 34 to 36 are directed to devices where CBP in the Additional Example 1 was replaced with other materials (electron-transport materials) disclosed in Sato '818.
14. The Additional Comparative Examples 37 to 39 are directed to devices where TPBI in the Additional Example 1 was replaced with other materials (electron-transport materials) disclosed in Sato '818.
15. The Additional Comparative Examples 40 to 41 are directed to devices where CBP in the Additional Example 1 was replaced with other materials (electron-transport materials) disclosed in Sato '818 and TPBI in the Additional Example 1 was replaced with other materials (electron-transport materials) disclosed in Sato '818. In other words, both CBP and TPBI were replaced with other electron-transport materials.
16. The Additional Comparative Examples 42 to 47 are directed to devices where CBP and TPBI in the Additional Example 1 was replaced with other materials (hole-transport and electron-transport materials) disclosed in Sato '818.
17. The Additional Comparative Examples 48 to 50 are directed to devices where TPBI in the Additional Example 1 was replaced with other materials (electron-transport materials) disclosed in Sato '818.

18. For comparison and reference, the results of Additional Example 1, Additional Comparative Examples 1-54, and Example 8 of the present specification are shown in Table I.

19. As is apparent from the results shown in Table I, the devices of Additional Comparative Examples 1-54 provide bad performance in operation durability, and many of the devices of the Additional Comparative Examples did not even emit light. In stark contrast, Additional Example 1 and Example 8 of the present invention show superior operation durability and external quantum efficiency.

20. The data already of record in the specification and the supplemental data submitted herewith demonstrate superior results of the claimed organic electroluminescent device over those of the cited prior art.

21. I hereby declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S. Code 1001 and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

By: Toshihiro Ise Date: Aug 11, 2008
Toshihiro Ise

TABLE 1

Example	Materials	External quantum efficiency	Operation durability @500cd/m2
Additional Example 1	ITO/CuPc(10)/NPD(50)/80%CBP+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	6.80%	1500h
Additional Comparative Example 1	ITO/CuPc(10)/NPD(50)/80%H-34+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.10%	45h
Additional Comparative Example 2	ITO/CuPc(10)/NPD(50)/80%H-4+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 3	ITO/CuPc(10)/NPD(50)/80%H-5+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.10%	38h
Additional Comparative Example 4	ITO/CuPc(10)/NPD(50)/80%H-7+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 5	ITO/CuPc(10)/NPD(50)/80%H-8+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.20%	25h
Additional Comparative Example 6	ITO/CuPc(10)/NPD(50)/80%H-10+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 7	ITO/CuPc(10)/NPD(50)/80%H-15+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 8	ITO/CuPc(10)/NPD(50)/80%H-20+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.10%	31h
Additional Comparative Example 9	ITO/CuPc(10)/NPD(50)/80%H-23+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.30%	40h
Additional Comparative Example 10	ITO/CuPc(10)/NPD(50)/80%H-30+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 11	ITO/CuPc(10)/NPD(50)/80%H-31+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 12	ITO/CuPc(10)/NPD(50)/80%CBP+10%H-34+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.10%	200h
Additional Comparative Example 13	ITO/CuPc(10)/NPD(50)/80%CBP+10%H-4+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 14	ITO/CuPc(10)/NPD(50)/80%CBP+10%H-7+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 15	ITO/CuPc(10)/NPD(50)/80%CBP+10%H-23+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.30%	185h
Additional Comparative Example 16	ITO/CuPc(10)/NPD(50)/80%H-40+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.60%	100h
Additional Comparative Example 17	ITO/CuPc(10)/NPD(50)/80%H-47+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.30%	40h
Additional Comparative Example 18	ITO/CuPc(10)/NPD(50)/80%H-50+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.20%	33h
Additional Comparative Example 19	ITO/CuPc(10)/NPD(50)/80%H-51+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 20	ITO/CuPc(10)/NPD(50)/80%H-52+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 21	ITO/CuPc(10)/NPD(50)/80%H-56+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 22	ITO/CuPc(10)/NPD(50)/80%H-86+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.40%	86h
Additional Comparative Example 23	ITO/CuPc(10)/NPD(50)/80%H-87+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.40%	80h
Additional Comparative Example 24	ITO/CuPc(10)/NPD(50)/80%H-101+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	1.20%	
Additional Comparative Example 25	ITO/CuPc(10)/NPD(50)/80%H-104+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	1.20%	
Additional Comparative Example 26	ITO/CuPc(10)/NPD(50)/80%H-118+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 27	ITO/CuPc(10)/NPD(50)/80%H-139+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 28	ITO/CuPc(10)/NPD(50)/80%H-148+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 29	ITO/CuPc(10)/NPD(50)/80%H-132+10%TPBI+10%Ir(ppy)3(38)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 30	ITO/CuPc(10)/NPD(50)/80%H-137+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	No light emission	
Additional Comparative Example 31	ITO/CuPc(10)/NPD(50)/80%H-202+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.10%	3h
Additional Comparative Example 32	ITO/CuPc(10)/NPD(50)/80%H-204+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LIF/Al	0.50%	10h

TABLE I (continued)

Example	Materials	External quantum efficiency	Operation durability @500cd/m2
Additional Comparative Example 33	ITO/CuPc(10)/NPD(50)/80%H-213+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 34	ITO/CuPc(10)/NPD(50)/80%BCP+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 35	ITO/CuPc(10)/NPD(50)/80%OXD-7+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 36	ITO/CuPc(10)/NPD(50)/80%TAZ+10%TPBI+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 37	ITO/CuPc(10)/NPD(50)/80%CBP+10%BCP+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	1.30%	450h
Additional Comparative Example 38	ITO/CuPc(10)/NPD(50)/80%CBP+10%OXD-7+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 39	ITO/CuPc(10)/NPD(50)/80%CBP+10%TAZ+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 40	ITO/CuPc(10)/NPD(50)/80%TAZ+10%BCP+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 41	ITO/CuPc(10)/NPD(50)/80%OXD-7+10%BCP+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 42	ITO/CuPc(10)/NPD(50)/80%H-10+10%BCP+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 43	ITO/CuPc(10)/NPD(50)/80%H-10+10%OXD-7+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 44	ITO/CuPc(10)/NPD(50)/80%H-10+10%TAZ+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 45	ITO/CuPc(10)/NPD(50)/80%H-34+10%BCP+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	0.10%	20h
Additional Comparative Example 46	ITO/CuPc(10)/NPD(50)/80%H-34+10%OXD-7+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 47	ITO/CuPc(10)/NPD(50)/80%H-34+10%TAZ+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 48	ITO/CuPc(10)/NPD(50)/80%H-42+10%H-43+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 49	ITO/CuPc(10)/NPD(50)/80%H-48+10%H-51+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 50	ITO/CuPc(10)/NPD(50)/80%H-51+10%H-56+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 51	ITO/CuPc(10)/NPD(50)/80%H-66+10%H-70+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	0.90%	66h
Additional Comparative Example 52	ITO/CuPc(10)/NPD(50)/80%CBP+10%H-70+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	6.00%	700h
Additional Comparative Example 53	ITO/CuPc(10)/NPD(50)/80%CBP+10%H-51+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Additional Comparative Example 54	ITO/CuPc(10)/NPD(50)/80%CBP+10%H-52+10%Ir(ppy)3(36)/ET-2(FM-1057)(36)/LiF/Al	No light emission	
Example 8	ITO/CuPc(10)/NPD(50)/85.9%CBP+8.5%ET-2+5.6%Ir(ppy)3(38)/ET-2(FM-1057)(36)/LiF/Al	7%	3000h